REMARKS

This Preliminary Amendment, filed in conjunction with a Request for Continued Examination ("RCE"), represents a full and timely response to the Final Office Action mailed February 8, 2006. The filing of this RCE and Amendment is permissible under 37 C.F.R. § 1.114. *See* M.P.E.P. § 706.07(h).

Claims 6 and 8 – 22 are presently pending in the application, each of which is believed to be in condition for allowance. Reexamination and reconsideration in light of the present Amendment and the following remarks are respectfully requested.

NEW CLAIM

Support for new claim 22 can be found variously throughout the specification, including, for example, on page 22, line 10 through page 23, line 5. Since this new claims is clearly distinguishable from the applied art of record, allowance of the same is courteously solicited.

CLAIM REJECTIONS – 35 U.S.C. § 102

In the Final Office Action, claims 6, 8 – 10, and 12 were rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Takayama '549 et al. (US Patent No. 5,948,549). This rejection is respectfully traversed.

Independent claim 6 of the present application recites a copper based sintered contact material, wherein, *inter alia*, the total amount of intermetallic compounds is 0.1 to 10% by volume.

In contrast, Takayama '549 fails to disclose, teach or even suggest the total amount of intermetallics compounds being equal to 0.1 to 10% by volume, as is recited in claim 7 of the present application. In fact, the Action has conceded that "Takayama '549 is silent as to the volume % of intermetallics in the contact", thereby rendering the § 102 rejection of claim 7 ineffective.

The Office Actions suggests that intermetallic compounds are likely present in Takayama '549 due to the presence in the starting mixture of individual elements capable of forming intermetallics. However, as shown by the references cited below, it would be highly unlikely or even impossible for the elements cited in the previous Office Actions lead to the development and dispersion of intermetallics in the copper based sintered contact material.

Evidence teaches against formation of a Tungsten – Tin intermetallic

According to *Hansen's Constitution of Binary Alloys*, WSn is not an intermetallic which was formed when attempts were made to alloy W and Sn (*see Hansen's at page 1217*). Test results demonstrate that W wire is not dissolved in molten Sn heated to 1680°C. Therefore, Takayama '549 does not teach or suggest the formation or dispersion of an intermetallic compound from W and Sn.

Evidence teaches against formation of a Molybdenum – Tin intermetallic

According to *Hansen's Constitution of Binary Alloys*, MoSn is not an intermetallic which was formed when attempts were made to alloy Mo and Sn (*see Hansen's at page 975*). Test results show that an MoSn alloy is not easily formed. Therefore, Takayama '549 does not teach or suggest the formation or dispersion of an intermetallic compound from Mo and Sn.

Evidence teaches against the formation of a Molybdenum – Tin intermetallic

With respect to MnSn intermetallic compounds, a recent study includes a Cu-Sn-Mn ternary constitutional diagram and corresponding experimental results (*see Experimental Investigation and Thermodynamic Calculation of the Phase Equilibria in the Cu-Sn and Cu-Sn-Mn Systems*, Metallurgical and Materials Transactions A, Vol. 35A, p. 1641-1654, (2004)). The study is applicable to the present sintered composition, in that it describes the particular formation of crystalline structures in alloyed materials which include each of Cu, Sn, and Mn, as is shown in Takayama '549 cited in the previous Office Actions.

In particular, the Office Action opines that a composition comprising Cu, 5% Sn, and 1% Mn might form an intermetallic consisting of MnSn (*see Table 4, compounds 24 and 25 of Takayama '549*). In fact, Takayama '549, Table 4 discloses a mixture of Cu, with 5 – 10% Sn and 1% Mn. The above cited study shows the equilibrium compositions of Cu-Sn-Mn compositions heated at various temperatures (*see Table IV of the cited study*), listing the equilibrium atomic percent compositions of Mn and Sn.

The Applicant has provided a chart graphically showing the data given in Table IV of the study (*see the chart included, which is labeled "Cu-Sn-Mn system constitutional diagram"*). The data is presented in units of weight percent, derived from the atomic percent values given in Table IV of the study. Note that temperature has little effect on the resulting

equilibrium composition characteristics. As shown by the graph, even if the amount of Sn in the composition is 10% by weight, the amounts of Sn and MN are significantly lower than the equilibrium values shown in Table IV. Accordingly, an MnSn intermetallic compound does not precipitate or disperse in a Cu-10Sn-1Mn alloy to which 1 wt% of Mn is added. Therefore, Takayama '549 does not teach or suggest the formation or dispersion of an intermetallic compound from Mn and Sn.

In addition to the evidence provided supporting the patentability of claim 6, *supra*, the present application further supports the superior and unexpected results obtained by the dispersion of intermetallics in the sintered contact material. The dispersed intermetallic compounds improve the sliding properties of the sintered contact material. For instance, the present specification (page 30, lines 16-21) states that the addition of Cr, Mo, and W in a large amount leads to a marked improvement in high-speed sliding properties, which is a result not even suggested in the prior art.

Accordingly, because Takayama '549 fails to disclose, teach or suggest each and every limitation of claim 6, a *prima facie* anticipation rejection has not been established, and withdrawal of this rejection is respectfully requested. *See, e.g., Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987) ("A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference").

Moreover, aside from the novel limitations recited therein, claims 8-10, and 12, being dependent either directly or indirectly upon allowable base claim 6, are also allowable for at least the reasons set forth above. Withdrawal of the rejection of these claims is therefore courteously solicited.

CLAIM REJECTIONS – 35 U.S.C. § 103

In the Final Office Action, claim 11 was rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Takayama '775 (U.S. Patent No. 6,015,775). These rejections are respectfully traversed. Additionally, claims 13 – 21 were rejected under 35 U.S.C. § 103(a) as allegedly being obvious over by Takayama '549 et al. (U.S. Patent No. 5,948,549).

Claim 11

Claim 11 claims, *inter alia*, a copper based sintered contact material containing **1 wt% or less MnS and/or 1 wt% or less graphite**, wherein the average particle diameter of said MnS and/or graphite ranges from **20 to 200 μm or less**.

To establish a *prima facie* case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. *See, e.g., Ex parte Clapp*, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985) ("To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references"); *In re Geiger*, 815 F.2d 686, 688, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987) ("When a rejection depends on a combination of prior art references, there must be some teaching, suggestion, or motivation to combine the references"; *ACS Hosp. Sys. v. Montefiore Hosp.*, 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984) ("Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination"); *accord.* MPEP 2143.

As indicated by the Examiner in the Final Office Action, Takayama '549 is silent to the particle size of the materials used.

Accordingly, in order for one to be motivated to use a particular size of particle as disclosed by Takayama '775, there must be some motivating factor provided in either Takayama '549 or Takayama '775 to use the particular size particle.

Looking to the disclosure of Takayama '775, it is stated that "the preferable particle **diameter of the solid lubricant particles is 0.1 to 3.0 mm** and the sintered contact layer desirably contains the solid lubricant particles in amounts of **15 to 50% by volume**." (*see Takayama '775 at column 3, lines 18 – 21*). Takayama '775 further states that the purpose of the 0.1 to 3.0 mm diameter solid lubricant particles is to "[catch] a solid lubricant layer laid over the sintered contact layer" by "[forming protrusions] by making the solid lubricant particles contained in the sintered contact layer **project from the surface** of the sintered contact layer." (*see Takayama '775 at column 3,lines 2 – 14*). The disclosure further states that if the particle diameter is smaller than 0.1 mm, then the protrusions will not project

adequately to catch the solid lubricant layer. (*see Takayama '775 at column 3, lines 21 – 23*) (Takayama '775 does not in fact show any embodiments having a diameter less than 0.3 mm; *see Table 2*). Additionally, the disclosure states that "[i]f the amount of the **solid lubricant particles is less than 15% by volume, satisfactory lubricity cannot be achieved**."

It is thus apparent that Takayama '775 provides no motivation for one skilled in the art to form a copper based sintered contact material containing MnS or graphite particles having a particle diameter ranging from **20 to 200 μm or less, and** being present in a concentration of **1 wt% less**.

It is further apparent that Takayama '775 in fact ***clearly teaches away*** from the limitations recited in claim 11 of the present application, further weakening the Final Office Action's proposed motivation to combine and modify the applied references. *See, e.g., In re Geisler*, 116 F.3d1465, 1471, 43 USPQ2d 1362, 1366 (Fed. Cir. 1997).

Therefore the Examiner has found the motivation to combine the elements of the prior art from the disclosure of the present application itself. Thus, the elements from the prior art cited in the Final Office Action are only combinable through the use of hindsight reconstruction. Accordingly, claim 11 is not obvious over Takayama '549 and Takayama '775, either alone or in combination, and therefore withdrawal of the rejection of this claims under 35 U.S.C. § 103 is respectfully requested.

Claim 13

Claim 13 as recites, *inter alia*, a copper based sintered contact material containing **12 to 16 wt% Sn and a Cu-Sn compound phase** which is dispersedly precipitated in the structure thereof.

As noted in the Office Action, Takayama '549 does not disclose or suggest a contact material containing 12 to 16 wt% Sn and a Cu-Sn compound phase; Takayama '549 merely discloses Sn in a maximum quantity of 10 wt%. Further, the claimed range of 12 to 16 wt% Sn yields a significant increase in bondability of the copper based sintered contact material relative to the iron based material, while also causing precipitation of **Cu-Sn δ phase intermetallic** compounds in the grain boundaries upon cooling (Page 14, lines 14-26). The precipitated Cu-Sn intermetallics restrain extendibility of the sintered contact and significantly alleviate agglutination. As indicated in the disclosure (Page 14, line 26 through page 15, line 7) the precipitation of the Cu-Sn intermetallic compounds in the grain

boundaries leads to characteristics particularly important for contacts used in applications such as cylinder blocks for hydraulic pumps and motors (where the sliding contact occurs in a centrifugal whirling manner). The characteristics are unexpectedly obtained with the higher range of Sn (12-16 wt%), which is not even indicated as being desirable in Takayama '549. In fact Takayama '549 teaches only that a β phase intermetallic is obtained when using Sn in the range disclosed (not more than 10 wt%). **Thus the range of 12-16 wt% Sn as claimed yields a distinct composition with unexpected characteristics**, as shown by the resulting δ phase intermetallic compound which is precipitated in the grain boundaries.

Accordingly, because Takayama '549 fails to disclose, teach or suggest each and every limitation of claim 7, a *prima facie* case of obviousness has not been established, and withdrawal of this rejection is respectfully requested. *See, e.g., In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974); *accord.* MPEP 2143.03.

Claims 14 -21

Aside from the novel limitations recited therein, claims 14 – 21, being dependent either directly or indirectly upon allowable base claim 6, are also allowable for at least the reasons set forth above demonstrating the allowability of claim 6 *supra*. Withdrawal of the rejection of these claims is therefore courteously solicited.

CONCLUSION

For at least the foregoing reasons, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the examiner is respectfully requested to pass this application to issue. If the examiner has any comments or suggestions that could place this application in even better form, the examiner is invited to telephone the undersigned attorney at the below-listed number.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 18-0013, under Order No. KOM-0153/INO/DIV2 from which the undersigned is authorized to draw.

Dated:

Respectfully submitted,

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